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May 3, 1958

VOL. 73 NO. 18 PAGES 273-288

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

"Hot" Ice

See Page 275

A SCIENCE SERVICE PUBLICATION

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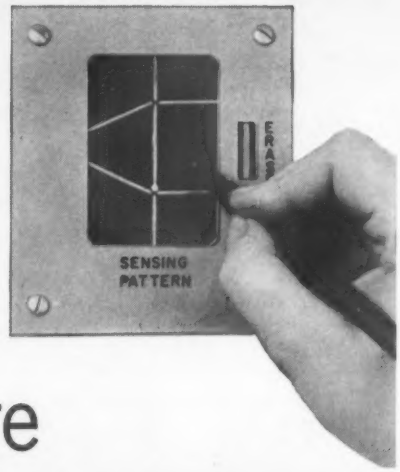

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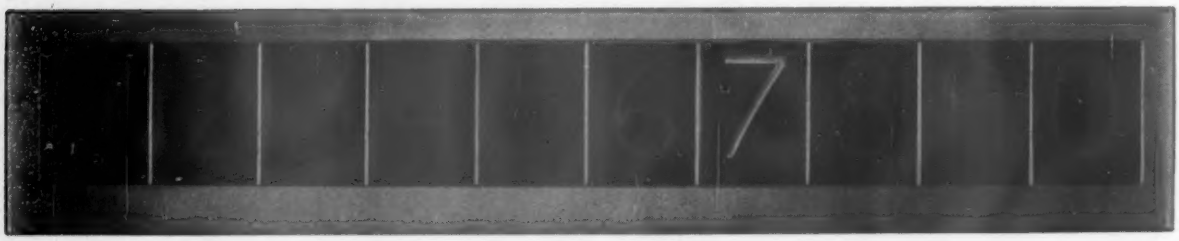


on new Bell Labs machine

A new device invented at Bell Laboratories "reads" a numeral while it is being written and instantly converts it into distinctive electric signals. The signals may be employed to make a numeral light up in a display panel, as above, or they may be sent to a computer or to a magnetic "memory" for storage.

The writing is done with a metal stylus on a specially prepared surface. Two dots, one above the other, are used as reference points. Seven sensitized lines extend radially from the dots. Transistorized logic circuits recognize numerals according to which lines are crossed.

The concept of a number-reader has interesting possibilities as a new means of communication from humans to machines. For example, in an adjunct to a telephone, it might provide inexpensive means of converting handwritten data into signals which machines can read. The signals could be transmitted through the regular telephone network to a teletypewriter or computer at a distant point. In this way, a salesman might quickly and easily furnish sales data to headquarters, or a merchant might order goods from a warehouse.

Tom Dimond, a B.S. in E.E. from the University of Iowa, demonstrates an experimental model of his number-reading invention. A similar device can also be made to read alphabetical characters. Small size and low power requirements result from transistor circuitry.

Modern communication involves many more fields of inquiry than the transmission and reception of sound. The experimental number-reader is but one example of Bell Telephone Laboratories work to improve communications service.

BELL TELEPHONE LABORATORIES
World Center of Communications Research and Development

RADIO ASTRONOMY

Moon's Distance Increased

Radar echoes reflected to earth by the moon's surface indicate that the planet may be farther from the earth than earlier measurements show.

➤ THE MOON is now suspected of being several miles farther from the earth than was previously thought.

Preliminary studies of radar echoes reflected back to earth by the lunar surface indicate the moon's observed distance is somewhat larger than the calculated distance, Dr. Benjamin S. Yaplee of the U. S. Naval Research Laboratory, Washington, D. C., reported.

He told a joint meeting of the International Scientific Radio Union (URSI) and the Institute of Radio Engineers that radar echoes from Venus would be necessary to confirm the longer distance.

Dr. Yaplee said the high-power radars and large antennas now available, used with the still experimental masers and paramagnetic amplifiers, will allow scientists to catch radar echoes from Venus and Mars, and also the sun.

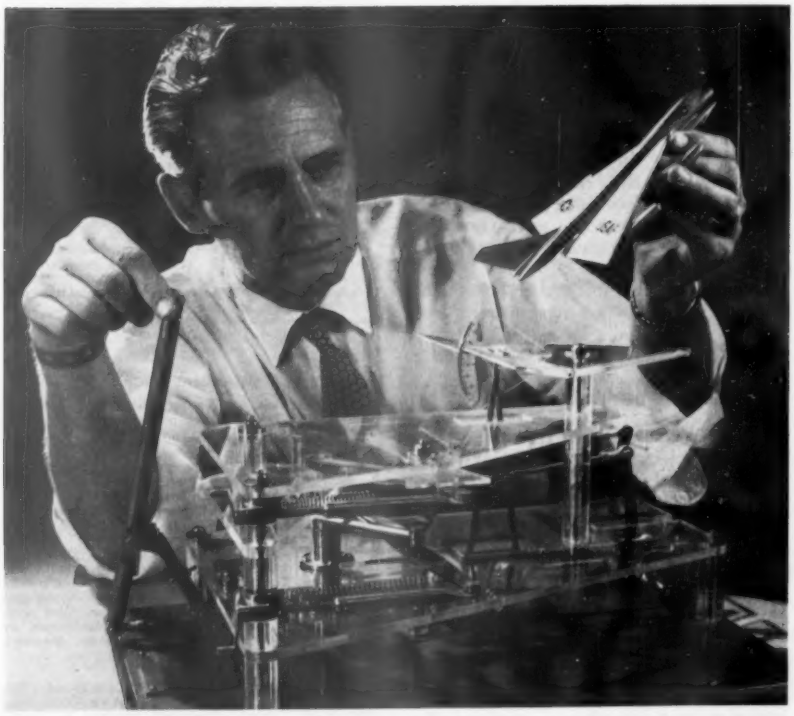
The relative distances to Venus, Mars and other planets are known quite accurately, but the actual distance to any of them is not known very accurately. The earth's mean distance from the sun, known as the astronomical unit, is taken as the yardstick for setting the scale of distances to the planets and stars.

If Dr. Yaplee's radar observations of a slightly farther distance to the moon are confirmed, the present value of the astronomical unit, 92,900,000 miles, will be changed. More importantly, however, the distances to all planets will be known much more accurately, a requirement for interplanetary space travel.

Dr. Yaplee also reported radar observations of the sun's extremely tenuous outer atmosphere, the corona that is visible to the naked eye only during solar eclipses, should yield information about the ionized gases of which the corona is composed.

By using various radar frequencies, he said, the reflection spectrum of the moon and planets can be obtained. In the case of the sun, the ionization gradient can be studied.

The average distance of the moon from the center of the earth has been given as approximately 238,900 miles.



SUPERSONIC FLIGHT CONTROL—Using models, a Bendix Aviation Corporation engineer shows how identical motions of the pilot's control stick (left) for the B-58 Hustler pass through a linkage system that moves the actual control surfaces only as much as varying flight conditions permit. Called "ratio changing," the variable motion is computed electronically in the Hustler over the plane's whole range of speed and altitude. The Hustler can thus be described as an automatic airplane.

Artificial Lightning

➤ ARTIFICIAL lightning bolts of 1,000,000 volts have been generated between a ship and a helicopter, Dr. M. M. Newman of the Lightning & Transients Research Institute, Minneapolis, Minn., reported to the joint meeting.

The man-made jolts of electricity traveled 3,000 feet along a suspended wire. Wire lengths of nearly two miles could be supported by the helicopter, Dr. Newman said.

Reason for generating the artificial lightning, he explained, is to find some way of cutting down on the interference with radio communications caused by natural lightning.

The 1,000,000 volt pulses were fired into the helicopter-supported wire from a seagoing schooner laboratory. The plane and its passengers were protected by 200 feet of nylon rope between the helicopter and wire.

Some typical lightning atmosphere were reproduced with the schooner generator. Since the source pulse is accurately known, Dr. Newman explained, this high power, mobile lightning generator provides a "decided advantage in continuing atmospherics propagation investigations."

"Possible psychological pilot aversion to being at the receiving end of an artificial lightning discharge" was avoided by having a scientist aboard during the test flights. A condenser was also installed across the gas tank gage to prevent possible explosion of the fuel tanks. The high voltage safety precautions proved adequate.

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PHYSICS

"Electric Eye" Used In Radiation Detector

See Front Cover

➤ UNDER THE impact of 2,000,000-volt electrons from a high voltage Van de Graaff accelerator, a 50-pound block of ice gives off a visible glow known as Cerenkov radiation.

This demonstrates the scientific principle underlying a new detector for high-intensity atomic radiation.

The detector, developed by Westinghouse Electric Corporation scientists, uses an "electric eye" to detect the same glow in ordinary water. From this the intensity of the atomic radiation causing the glow can be measured.

For protection, the photograph that appears on the cover of this week's SCIENCE NEWS LETTER was taken through a circular three-foot-thick window containing a transparent solution of zinc bromide. The window is imbedded in the equally thick concrete walls surrounding the Van de Graaff machine.

Science News Letter, May 3, 1958

GENERAL SCIENCE

Describe Future Science

Conquest of many virus diseases, treatment for mental illnesses, new sources of power, world-wide television communication, all lie within the grasp of the future scientist.

➤ IF MAN CAN avoid "the dangers of destruction" that can result from an atomic or biological war, he faces a future that will make people "healthier, wealthier and perhaps even wiser," Watson Davis, director of SCIENCE SERVICE, Washington, told a Conference on Technical and Scientific Writing at Michigan State University.

"Compiling timetables for the science of the future is risky and hazardous," the veteran science writer said, "but here are some guesses at what may happen."

About a decade hence (1970):

1. Cures for some of the most prevalent kinds of cancer, whether through chemotherapeutics, or prevention arising out of better understanding of metabolic processes.

2. The conquest of more virus diseases, including the so-called common colds, either through vaccination or drugs.

3. Treatments for more of the mental diseases that will rescue and return to usefulness more of those psychotically ill.

4. Power from atomic fusion, the hydrogen bomb reactions.

5. Harnessing of the sun's energy through artificial photosynthesis that beats the green leaf at its own game.

6. Exploration of the moon by unmanned, but information-gathering, rockets, and similar space probes towards Mars and Venus.

7. More major mechanizations of industrial processes, together with development of economic devices to keep employment at an optimum level.

8. More universal assaying of human abilities and the enhancement of educational opportunity that will more nearly utilize the talent of all the world's population.

9. International television through signals relayed by reflection from special TV satellites.

10. Development and application of a simple and safe birth control method that could modify the world's population explosion.

More distant in the future, some perhaps by 2000, there are these possibilities:

1. Discovery and harnessing of unknown forces within the atomic nucleus, giving new sources of energy, transmutations of matter, and new knowledge of the possible ultimates of the physical universe.

2. Exploration of the cosmos by new astronomical methods that will delineate its size in time and space, whether the universe has boundaries, whence it came, whither it is going, how long it will last, and its operation and control.

3. Approaches to the postponement of individual death, through understanding and remedial treatment of the degenerative diseases and by the prolongation of life through nutritional, biological and other means.

4. Understanding of the nature of life, through biophysical and biochemical exploration of the functions and mechanisms peculiar to animate matter.

5. The creation of life from inanimate materials, duplicating the genesis of primordial slime in the opening eons of the living earth.

6. Attempts to discover whether some of the probable hundred million planets of other stars have life or conditions for life like that on earth.

7. Development of new methods of rocket propulsion that will make interstellar travel more practical.

8. Development of standard synthetic diets easily assimilated that will supply the calories and protective factors for optimum mental and physiological existence, possibly available to all as a public utility.

9. Universal communication facilities so that sight and sound will link on demand any individuals anywhere on earth, coupled with world-wide TV channels for music, education, information, public meetings and ceremonies, etc.

10. Development of artificial intelligence machines, that will do things people do now —write letters, do bookkeeping, translate languages, file and retrieve information, teach students individually, plan and operate industrial processes, cook, serve meals and clean houses, drive automobiles and airplanes, etc.

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CHEMISTRY

Hardwoods Better for Rocket Fuel, Ice Cream

➤ HARDWOOD is preferred over softer wood not only for home floors, but also for making rocket propellants, clothing and even ice cream.

Hardwood trees of northeastern United States and Canada are invading the field of cellulose production once held exclusively by cotton, the American Institute of Chemical Engineers and the Chemical Institute of Canada meeting in Montreal learned.

Wood cellulose recently has gained wide favor in production of cellulose acetate film, triacetate yarn, solid rocket propellant bases, explosives and ice cream ingredients, Dr. Morris Wayman, technical director of Columbia Cellulose Co., Ltd., Prince Rupert, B. C., reported.

A present major goal of the cellulose industry, he said, is to perfect processes so that even more of the hardwoods such as aspen, cottonwood and poplar can be used.

Hardwood is more attractive than the softer pines and other cone-bearing trees because it contains a higher proportion of the commercially important alpha cellulose and less mannan, a natural compound important to many industries but not desired in production of pure cellulose.

One disadvantage of hardwoods over soft is that hardwood contains a higher percentage of xylan, a gummy substance that must be removed.

Derivatives of cellulose are among the most widely used natural raw materials of the chemical industry. Dr. Wayman pointed out that their uses range from rocket fuels and fuel binders to thickening agents for ice cream.

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VOL. 73 MAY 3, 1958 NO. 18

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PHYSIOLOGY

Noise Affects Hearing

➤ THAT POWER mower which is now making its reappearance on lawns across the United States, coupled with all of the other machines and appliances in homes and factories, may be responsible for severe loss of hearing.

The noise produced by automobiles, planes, trains, subways, electric shavers, vacuum cleaners, radio and television sets plus eight hours of noise in a factory can add up to ear damage in as short a period as a few months, C. D. Yaffe of the U.S. Public Health Service told a group attending an Industrial Health Conference in Atlantic City, N.J.

Mr. Yaffe is conducting a study, now in its sixth year, on the effect of industrial noises.

Attempts have been made to reduce the exposure to industrial noise by changing processes and using other noise abatement procedures, he said. But some situations do not lend themselves to noise reduction. The solution for this type of situation may eventually call for redesign of equipment.

Noise exposures can produce significant hearing loss regardless of whether the individual is exposed to any noise of consequence off the job. The number of workers 1,000,000, probably exceeds the number exposed to any other occupational hazard, he indicated.

The Public Health Service, in cooperation exposed to hazardous noise levels, about with the U.S. Bureau of Prisons, is studying the noise levels and hearing loss of prisoners in four Federal penitentiaries. Areas of study include woolen and cotton textile mills, clothing, shoe and furniture manufacture, the manufacture of steel shelving and other sheet metal products, brush manufacturing, and printing.

Preliminary findings indicate that, under certain noise conditions, most of the hearing loss occurs in the first three months of employment. A study is underway to determine what percentage of loss is temporary, Mr. Yaffe reported.

Further studies and better methods of reducing factory noises will be conducted in the future to determine the extent of hearing loss caused by constant industrial noise plus the background noise of machinery and appliances experienced by the public daily.

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PSYCHOLOGY

Study Rats' Psychology

➤ EVEN A RAT can be sympathetic.

This was reported to the Eastern Psychological Association meeting in Philadelphia by Dr. Russell M. Church of Brown University.

The rats in Dr. Church's experiments were allowed to look through a window and see another rat being given a mild electric shock. After watching the other rat in pain for 40 seconds, the experimental rat was shocked for one second. After repeated experiences of this, the experimental animal learned to show fear at sight of the other rat in pain.

Two other groups of rats served as "controls" for the experiment. One group had nothing happen to them while the other rat was shocked. The other group was shocked at times unrelated to the pain of the other rat.

Rats in the shocked control groups displayed emotion while the neighbor rat was being shocked, but the emotion was less than that displayed by the experimental animals.

The emotion in the shocked control animals may have been due to "self-conditioning" rather than sensitization, the psychologists conclude, however.

Rats are "Distracted"

➤ RATS THAT have learned to distinguish a horizontal stripe pattern from a vertical one have their scores cut down by the sight of a cardboard profile of a rat during the test.

The fact that rats can be "distracted" by a stationary cardboard "rat" was also reported to the Psychological Association by Drs. Harry L. Jacobs of Bucknell University and F. Loren Smith of the University of Delaware.

Scores of the rats were cut down even more, however, by a white short-haired toy dog that was moved around in the vicinity of the "wrong" pattern. The greatest distraction of all was provided by a live rat.

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GENERAL SCIENCE

Committee Denounces Federal Secrecy Rules

➤ THE HOUSE Committee on Government Operations has strongly denounced the Government's secrecy policies on scientific information and national defense.

The committee charges the American scientist is "mired" in a "swamp of secrecy" by the Government's security regulations. Although these excessive secrecy rules are issued in the name of national security, they stifle the nation's scientific progress, the committee says in a recently issued report.

To help free scientists from the present security strait jacket, the House Committee recommends:

1. A system of uniform security clearance, applying to scientists working for all agencies and all defense contractors, should be established to increase the efficiency and economy of the security clearance procedure.

2. The "need to know" criterion should be abolished so that American scientists who have passed a rigid security clearance may have ready access to the technological information necessary to help the nation regain scientific supremacy.

3. There should be no attempts to hide discoveries of the basic laws of nature made in the past, present or future.

The committee report, submitted to House Speaker Sam Rayburn (D.-Tex.), is based on a study made by its special Government information subcommittee headed by Rep. John E. Moss (D.-Calif.).

In recent years, the report says, science and secrecy have collided head-on in the United States. Thus far, secrecy has dominated. During the same period, the U. S. appears to have lost the lead in some areas of scientific achievement, dramatically demonstrated to the world when Russia launched the earth's first two space satellites.

Restrictions on exchange of scientific information are closely related to the U.S. loss of the first lap of the race into space, the committee charges.

The only real national security lies in scientific progress, they conclude, and scientific progress relies heavily on a free exchange of ideas. Excessive restrictions on the free exchange of scientific ideas, therefore, defeat national security.

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THERMOMETER—Accurate measurement of temperatures in outer space may be possible with this germanium resistance thermometer, shown with its outer case removed, developed by J. E. Kunzler, T. H. Geballe and G. W. Hull of Bell Telephone Laboratories, New York. Once calibrated, this thermometer is reproducible to better than a few ten thousandths of a degree at the boiling point of helium (4.2 degrees Kelvin) even after repeated cycling from room temperature.

PHARMACOLOGY

Barbital Beats New Drugs

➤ AN OLD established drug, butabarbital sodium, has proved superior to recently introduced tranquilizers for patients suffering anxiety and tension.

Butabarbital sodium has been in wide use since 1943. The results of a five-year comparative study of calming drugs showed that, although butabarbital sodium is not a perfect sedative, it most closely approaches the ideal.

Ten factors were used to determine the desirability of each of six different drugs, plus a placebo, or "dummy" pill containing no medication.

The first factor was high predictability of satisfactory control, with the usual therapeutic dosage, within a reasonable period of time. Other factors included the unfavorable aspects of the drugs, such as tendency toward addiction, difficulty of administration, daytime drowsiness, reduction of mental processes, and variation of normal function of a major organ or system of the body.

When 168 patients were given one or more of the following drugs, glutethimide, acetylcarbromal, the placebo, phenobarbital, proclorperazine and meprobamate, the butabarbital sodium led all the rest in desirable performance and lessened after-effect.

Although daytime anxiety and insomnia may be separate problems, it is possible by means of effective tranquilizers to relieve both by small multiple daytime dosage, Dr. Arthur J. Grossman of New York Medical College reported at the meeting in Philadelphia of the American Society for Pharmacology and Therapeutics.

Butabarbital sodium offered the best performance of those drugs tested for the control of anxiety and insomnia by daytime dosage. The five-year study was conducted by a New York Medical College investigating team headed by Dr. Robert C. Batterman. He was assisted by Dr. Grossman and Drs. Paul Leifer and George J. Mouratoff.

Science News Letter, May 3, 1958

ROCKETS AND MISSILES

Missile Reentry May Be Routine, Due to Plastics

➤ ROCKETS soon may be brought back from space as a matter of routine, thanks to a revolutionary family of plastics.

The new materials which are produced and formed like plastics, but incorporate the strength of metals and heat resistance of ceramics, are able to function "in areas where all other known materials break down," a joint conference of the American Institute of Chemical Engineers and the Chemical Institute of Canada, meeting in Montreal, was told.

"Haveg compounds," as the new family of materials is called, are not metals, plastics or ceramics, but a "combination developed for high temperature operation," John H. Lux, Haveg Industries, Inc., Wilmington, Del., and Norbert H. Noland, Reinhold Engineering and Plastics Co., Norwalk, Calif., reported.

A combination of composition and a unique reaction mechanism while being exposed to high temperatures makes the materials functional at temperatures up to 12,000 degrees Fahrenheit.

The materials are "reinforced plastics" and basically are similar to many familiar products made of plastic reinforced with other materials.

Haveg compounds consist of inorganic silicates similar to glass, held together with an organic plastic binder, the engineers reported. Consequently, the compounds can be produced and molded like plastics, but assume the rigidity and strength of glass.

When a nose cone or missile fin made of Haveg compounds encounters extremely high temperatures, a chemical reaction takes place between the organic plastic and the inorganic silicates, producing a new material that actually reflects away most of the heat, and has a high resistance to corrosion.

Haveg-based nose cones, motor cases, insulators and jet vanes capable of withstanding temperatures near 6,000 degrees Fahrenheit already are in production. Newer compounds that will withstand reentry runs of 20 seconds at 12,000 degrees Fahrenheit have been developed.

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● RADIO

Saturday, May 10, 1958, 1:30-1:45 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Elizabeth Drews, professor of education, Michigan State University, East Lansing, Mich., will discuss "Gifted Children."

LABORATORY ANIMAL—The nematode, Caenorhabditis briggsae, ***may provide answers to unsolved problems of cell growth, differentiation, and cell deterioration and disease. The blunter end (right) of this bi-sexual worm is its mouth; the intestine is the dark area exending its length. The doughnut-like shapes are an egg which has begun to divide. Magnified here about 100 times, the nematode actually measures approximately one-twentieth of an inch in length. A group of Kaiser Foundation scientists headed by Dr. Ellsworth C. Dougherty is studying the nematode. A conference devoted to a discussion of this and similar animals was recently sponsored by the New York Academy of Sciences and the Kaiser Foundation.***

INVENTION

Supersonic Device Removes Barnacles

➤ AN ELECTRONIC device that prevents barnacles from growing on the steel hulls of vessels will save Australian shipowners tens of thousands of dollars.

The device has been tested successfully for a year on the interstate vessel Manoora, the only ship fitted with the device.

Shipowners saved at least $500 in docking and fuel costs each time the vessel went into dry dock.

The device sends supersonic waves through the steel hull, shaking off barnacle growth. Research during several years showed that barnacles were allergic to vibrations between 17 and 20 kilocycles a second. The vibrations cannot be felt or heard by passengers or crew.

Engineers said the device makes it unnecessary to paint hulls in the future with anti-fouling compound.

The equipment has a transmitter unit that generates a high frequency current. This current is transformed into mechanical vibrations, which are transferred to the hull of the ship. The latter operation is performed by a transducer.

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ACOUSTICS

Birds Undaunted by Sound

➤ BLASTS OF high-frequency sound above the limits of human hearing have not turned out to be a promising weapon against bird pests.

This is shown in experiments reported by scientists at the National Research Council and the Canadian Wild Life Service in Ottawa, Canada.

The belief that birds could be repelled by ultrasonics has persisted for a number of years despite the lack of supporting scientific evidence, the scientists explain in a report appearing in the *Journal of The Acoustical Society of America.*

Wild ducks are proving a serious pest in Canada because of their depredations on western grain fields. It was hoped sound inaudible to humans could be used as a weapon to drive them away without annoying any persons in the vicinity.

Experiments were conducted to learn the effect of sound of various frequencies, using Peking ducks since they are derived from the wild mallard duck by selective breeding.

The Peking ducks do respond to sound, it was found, but unfortunately they do not seem to notice the ultrasonic frequencies but respond to the same sounds that annoy humans, too.

They do not respond to 20 kilocycle sounds at intensities up to 130 decibels. They respond slightly at 17 kilocycles which is about the limit of human hearing. They show increasing sensitivity as the frequency is reduced to 4 kilocycles (approximately the upper notes of a piccolo). At 500 cycles per second, the birds respond to a sound only as loud as ordinary speech one foot away.

The birds respond to the sound irritation with a characteristic vigorous body movement that starts with a shake of the head and ends with a twitch of the tail.

Even ducks kept hungry for three days will not feed in the blast of a siren emitting a 10-kilocycle shriek at an intensity of 135 decibels.

Trial of lower frequencies revealed the Peking ducks seem to be most sensitive to low-frequency sounds. When their feeding and drinking troughs were placed beneath a horn loudspeaker and the hungry ducks were put into the pen and encouraged to feed, they ran away as soon as the sound was switched on and did not return even when it was turned off.

In experiments in the field, blasts of an air raid siren mounted on a truck drove the ducks away all right, but they were back 100% strong after a few hours—unless of course the area was filled with fresh birds each day.

The use of high-intensity sound against the ducks is just not an economical proposition, the scientists conclude.

Scientists taking part in the study are Drs. G. J. Thiessen and E. A. G. Shaw of the Canadian National Research Council and Drs. R. D. Harris, J. B. Gollop and H. R. Webster of the Canadian Wild Life Service.

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MEDICINE

Record Fetal Heartbeat

➤ AN ELECTROCARDIOGRAPHIC machine is being tested to detect infant distress during labor. The 160,000 annual infant deaths associated with birth and the numbers afflicted with cerebral palsy and mental retardation may be reduced as a result.

The machine, originally designed to record the fetal heartbeat, has already proven more efficient in diagnosis of fetal life early in pregnancy than traditional methods, Dr. Edward H. G. Hon of the Yale School of Medicine reported to scientists at the American College of Obstetricians and Gynecologists meeting in Los Angeles.

The development of the highly sensitive electronic machine is part of a research project at Yale aimed at finding a reliable means to determine if the course of labor is detrimental to the unborn child. The necessity of immediate intervention to prevent fetal damage or death is also important for the doctor to be able to evaluate.

Although more research is needed before the new machine can be used in every delivery room, clinical tests indicate encouraging results, Dr. Hon said.

The machine can detect fetal heartbeat in very early periods of pregnancy. The usual auscultation by stethoscope is generally not successful until after 18 to 20 weeks of pregnancy. Doctors were able to detect fetal life with 100% accuracy in 23 mothers during this early period. In later pregnancy, a 92% accuracy figure was obtained in 127 patients where the usual detection of fetal heartbeat by stethoscope failed.

Electrodes attached to the abdominal wall of the mother pick up both maternal and fetal heartbeats and carry the signal to the machine. Another portion of the machine records the heartbeat of the mother only. An electronic unit subtracts the mother's heartbeat from the combination heartbeat, leaving only the fetal beat.

Working with Dr. Hon at Yale are Dr. O. W. Hess, Dr. Frank Chung, Margaret Ranek, Jean Peterson, Jacqueline Corbett, Mildred Boynton and technician, George Park.

Science News Letter, May 3, 1958

The pava bean, a favorite of Italians, Greeks, and other Mediterranean peoples, is the only food known to cause *hemolytic anemia.*

FINGERLINGS—These young trout, or fingerlings, are transferred in bulk from hatcheries to game streams. The California Department of Fish and Game uses motor-driven conveyors and 1,490-gallon tank trucks. A trace of silicone is added to the tank water to reduce foam accumulation.

GENETICS

Heredity Plays Role In Heart Diseases

➤ HEREDITY plays an important role in susceptibility to coronary artery disease and high blood pressure as well as certain other diseases of the heart. The influence of heredity varies, however, in different people.

The role heredity plays in diseases of the heart is extremely difficult to study because of the influence of environment on these diseases, Dr. Victor A. McKusick of the Johns Hopkins Hospital reports in *Eugenics Quarterly* (March).

Atherosclerosis, hardening of the arteries leading to coronary attacks, is closely connected with hypertension, high blood pressure, which in turn is related to stress, sometimes caused by environmental factors.

Finding the people who are "genetic susceptibles" is the most promising attack on many of our major illnesses, Dr. McKusick suggests.

Family history is of utmost importance in diagnosing coronary artery disease, for example, in a young man with a chest pain or in working out a diet for a heart patient. Young coronary patients studied have shown certain peculiarities which may have an inherited basis.

Such guideposts for our chances for heart disease are inexact, but they are still one of our best leads for prevention at the present time. Knowing the family heredity makes it easier to pinpoint the person susceptible to heart disease and work out better preventive methods, Dr. McKusick concludes.

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BOTANY

Corn Hybrid Resembles Ancestral Plant

➤ A MAN-MADE ancestor may shed some light on the evolution of cultivated corn, a grain described as "unique among the cereals" in its capacity to produce grain on a grand scale.

Prof. Paul C. Mangelsdorf of Harvard University's Botanical Museum, Cambridge, Mass., told scientists at the American Philosophical Society meeting in Philadelphia that a hybrid corn has been produced which has many of the characteristics of prehistoric corn.

Recent studies of fossil corn pollen and prehistoric corn cobs gave scientists some idea of what the ancestral cereal might have looked like. Pod corn, with its covered seeds, and pop corn, with its small ears and seeds, were bred. The resultant hybrid not only has "several of the principal characteristics found in prehistoric corn but it also exhibits other traits which are probably ancestral," Prof. Mangelsdorf said.

It is a many-stalked plant with the ears borne on the higher, more slender regions of the stalks. The ears have few husks and these often flare open at maturity, thus freeing the small, chaff-covered seeds. Ears and tassels have both male and female flowers.

Tripsacum, a wild relative of corn, also flowers the same way, pointing to another possible link in the evolution of corn. In today's cultivated corn, the staminate inflorescence or male flowering is the tassel alone and the ear carries the female flowering, the corn "silk."

Prof. Mangelsdorf traced five steps in the "evolution under domestication" of the cultivated corn plant of today. These are:

1. The many-stalked plant became single stalked.
2. The ear grew on the lower and stronger part of the stalk which can bear larger and heavier ears.
3. The ears bore only female flowers and produced only grain in their lower stalk position.
4. The ear had more husks and became completely enclosed by them.
5. The individual grains lost their covering.

Science News Letter, May 3, 1958

CHEMISTRY

Isolate Visible Amount of Element 97, Berkelium

➤ ISOLATION of berkelium, element 97, in quantities large enough to see and weigh was announced to the American Chemical Society meeting in San Francisco, by University of California scientists, Drs. B. B. Cunningham, Stanley Thompson and Glenn T. Seaborg.

This dinosaur of matter probably existed when the universe was born 5,000,000,000 years ago but like the other elements heavier than uranium died out through radioactive decay soon after creation.

Berkelium was recreated in 1949 in atom-smashing bombardments in the University of California's 60-inch cyclotron. Only minute tracer quantities of the element have been available until now. Even the amount now isolated is barely on the borderline of visibility, approximately one hundred millionth of an ounce, or 0.3 micrograms.

Isolation was achieved by putting eight grams of plutonium into the high neutron flux of the materials testing reactor at Arco, Idaho, in 1952 and letting it cook for six years. During this time plutonium atoms were fattened up by neutrons until they became berkelium atoms. About two months ago the material was brought to Berkeley, and definite isolation was achieved on April 13.

The berkelium isotope isolated is 249, and it has a half life of 280 days.

The scientists said that probably only two more elements, 98 and 99, have isotopes with half lives long enough to sustain hope of their eventual isolation.

Dr. Cunningham is the scientist who first isolated plutonium, in 1942. His skill in working with submicroscopic amounts of materials played a big role in important phases of the atomic bomb project. In the isolation of berkelium it was a tiny Cunningham magnetic balance that weighed the element.

Science News Letter, May 3, 1958

MEDICINE

Folklore Provides Guide To Useful Medical Drugs

➤ A BACTERIA-KILLER from a rock garden plant is just one of the potential new drugs scientists are investigating, thanks to folklore.

Dr. E. H. Lucas, professor of horticulture at Michigan State University, East Lansing, reported finding a bactericidal substance in St. John's Wort, a large group of plants that includes herbs and small shrubs found in rock gardens.

Actually, Dr. Lucas said, folklore even points out the correct "recipe" or, in some cases, the medically useful flower parts. Folklore about St. John's Wort says to use only the petals and to discard the calyx. Today scientists find that only petal extracts inhibit bacterial growth.

Considering that the men who originated the folklore cures must have worked on a "trial and error basis with no scientific background to guide them, limited communication with other experimenters and only the plants in their own area to work with, it is a mystery that they learned so much," Dr. Lucas said.

He has investigated about 600 species of plants mentioned in folklore as therapeutic drugs. Approximately 90% of this folklore has some factual basis, Dr. Lucas believes.

If a researcher uses folklore as a guide, his chances of finding effective drugs are three times better, the MSU scientist estimates, than if he simply selects plants at random.

By fitting modern experimental procedures to the "origin of the lore"—investigating the human populations as well as the original plant—scientists can learn a great deal.

Science News Letter, May 3, 1958

IN SCIENCE

BIOCHEMISTRY

Amine Found in Human Tissue for First Time

➤ AN AMINE which may play an important role in the control of blood pressure and heart function has been found in human tissues for the first time.

The amine, or nitrogen-containing chemical, is called 3-methoxy norepinephrine. The chemical is of basic interest because it is derived from norepinephrine. Norepinephrine and closely related compounds are known to stimulate the heart and blood pressure. Also, brain norepinephrine, together with serotin in the brain, is implicated in the central regulation of the autonomic nervous system.

The amine had been noticed in the urine of patients receiving norepinephrine injections to support falling blood pressure. Later, it was found in rat liver.

It was discovered in human tissue in adrenal gland tumors.

Dr. Albert Sjoerdsma, William King, Dr. Sidney Udenfriend and Lemuel Leeper, all of the National Heart Institute, Bethesda, Md., found the new amine.

Science News Letter, May 3, 1958

PSYCHOLOGY

English Students Like To Gamble for Big Prize

➤ CHILDREN like to gamble. They prefer to take a chance on a large prize rather than to accept a sure thing of lesser value.

But this tendency diminishes with increase in age.

This willingness of young children to gamble was shown in a study of English school children conducted by Drs. John Cohen and C.E.M. Hansel of the psychology department of the University of Manchester, England, and reported by them to *Nature* (April 19).

Three groups of school children were studied, aged 9, 12 and 15 years respectively. The children were offered a choice between a single package of candy, a one-in-five chance of winning five packets and a one-in-25 chance of winning 25 packages.

Of all the children, 81% preferred to take a chance on getting a bigger prize. Only seven out of 50 15-year-olds preferred the one-in-25 chance, however.

"In a true gambling situation," the psychologists conclude, "if one prize is certain, provided it is large enough in relation to the individual's scale of values, almost everyone will prefer it, however much larger the uncertain prize."

But if the certain prize is negligible, the uncertain but worthwhile prize will be preferred.

Science News Letter, May 3, 1958

CE FIELDS

TECHNOLOGY

Engraving Machine Rules Near-Perfect Grating

➤ THE WORLD'S most precise engraving machine is now producing the largest and most perfect diffraction gratings ever made.

It is electronically controlled by an extremely accurate source of light waves, a mercury arc. Diffraction gratings made by the machine are used for analyzing the light from stars and for studying the structures of atoms and atomic nuclei.

Dr. George R. Harrison of Massachusetts Institute of Technology reported development of the engraving machine to the American Philosophical Society meeting in Philadelphia. Diffraction gratings are made by marking very fine parallel lines on glass coated with a thin film of aluminum to produce a mirror.

The machine can rule 74,500 parallel grooves on a mirrored glass five inches wide and ten inches long. The grooves, each about one ten-thousandth of an inch deep, are equally spaced to within a fraction of a millionth of an inch.

When light shines on such a grating, it is broken into a rainbow-colored spectrum, from which scientists can tell much about the temperature and nature of the light source. Work on controlling the engraving machine by light waves began about ten years ago, Dr. Harrison said.

The ruling engine is sensitive to the slightest vibration, so its mechanical parts are immersed in a tank of oil enclosed in a large plastic box to keep out dust. Once the engraving process has started, it cannot be interrupted until the grating is complete and no one is allowed to enter the room during it. Progress of the engraving is monitored by remote control.

Dr. Sumner P. Davis, Neville Sturgis and Yohiko Yamada collaborated with Dr. Harrison in developing the precise engraving machine.

Science News Letter, May 3, 1958

RADIO ASTRONOMY

Foresee New Method of Transmitting Messages

➤ A NEW method of long-distance communications may use the trail of ionized air left by meteors, or "shooting stars," as they burn up in the earth's atmosphere.

Another possibility for transmitting messages over great distances is to reflect radio waves from earth satellites or from the ionized air in the wake of satellites, which have predictable times of passages. Most meteors on any given day appear at random, although many occur in reliable showers such as the Lyrid shower of April 22.

The maser, a new device still in the development stage, has already given radio astronomers the ability to detect objects more than twice the distance previously possible. Steady improvements in the maser's operation, possible only at temperatures at absolute zero, are expected to double the distance again within a few months.

The meteor and satellite message-sending methods, and the maser, were discussed formally and informally at a conference on The Radio Noise Spectrum, meeting in Cambridge, Mass., sponsored by Harvard College Observatory and the U. S. Army Signal Corps.

High-frequency radio waves such as used in television, which usually travel only in straight lines, have been transmitted beyond the horizon by reflecting them from ionized air in meteor trails.

Further studies, some of which are underway at Stanford University in California, may show these transmissions are commercially useful for teletype systems. Messages would be stored on magnetic tape, then sent in a high-speed "squirt" whenever a meteor occurs in the right place.

The same kind of techniques can be applied to using satellites and their ionized trails as message relay stations, with the added convenience that their times of passages can be predicted.

One maser, the first known in operation, is being used with the Naval Research Laboratory's 50-foot antenna in Washington, D.C. Another such device, working at a wavelength of 21 centimeters, has been operated successfully in the laboratory by scientists at Harvard College Observatory. Masers promise a great expansion of the radio astronomer's horizon. (See SNL, April 12, p. 227.)

Science News Letter, May 3, 1958

PUBLIC SAFETY

After H-Bomb Blast, Stay in Shelter

➤ TRYING to escape on foot after an H-bomb blast may finish what the nuclear explosion started. You would best "stay put" if there is still shelter available.

This is the interpretation Dr. Thomas Haley places on animal experiments carried out at the Atomic Energy Project of the University of California at Los Angeles.

Muscle response, fatigability and work output of irradiated and unirradiated rats were compared. It was found rats subjected to large doses of radiation had very poor muscle response, tired rapidly with a slight amount of work. Irradiated rats that were exercised tended to die sooner than rats that were kept quiet.

Dr. Haley believes his experiments are a warning to avoid exercise following total body exposure to radiation. In the first place, he points out, one might not be physically capable of evacuation. In the second, the exercise of attempting to walk out of a bombed area might hasten death.

"If there is shelter, that is, some protection from 'hot debris', and food and water, one should probably remain there for several days," he says. "You may experience radiation sickness, but you may at least live to recover."

Science News Letter, May 3, 1958

TECHNOLOGY

Engineers Develop Solar Refrigerator

➤ A SUN-POWERED refrigerator has been developed by two Israeli engineers.

The refrigerator, which operates solely on power derived from the sun, is connected by a pipe to a radiation-collector installed on the roof of the owner's home.

A pilot model of the solar cooler is now undergoing final laboratory tests. It is the invention of Kurt Doron Ofer and J. Giladi of the faculty of chemical technology at the Technion-Israel Institute of Technology in Haifa.

Science News Letter, May 3, 1958

METEOROLOGY

Heaviest Rainfalls Ignore National Borders

➤ THE WORLD'S heaviest rainfalls have no regard for national boundaries, a report by the U.S. Weather Bureau shows.

Unionville, Md., holds the record for the world's greatest observed rainfall, 1.23 inches in one minute on July 4, 1956. In second place is Fussen, Bavaria, with 4.96 inches in eight minutes on May 25, 1920.

Plumb Point, Jamaica, comes next, having been deluged with 7.8 inches within 15 minutes on May 12, 1916. Exactly 12 inches fell in 42 minutes at Holt, Mo., on June 22, 1947.

When a full day is considered, Baguio in the Philippine Islands holds the record, 45.99 inches on July 14-15, 1911. The two-day record is held by Funkiko, Formosa, where 65.79 inches fell on July 18-20, 1913.

For periods of a week or longer, however, Cherrapunji, India, holds all the records, from 131.15 inches within the seven days starting on June 24, 1931, to 1,605.05 inches for the two-year period of 1860-1861.

To help answer the questions, "How hard can it rain?", "How much in an hour, a day, a week?", the Weather Bureau looks to the past to find out how hard it has rained. Even this is not an easily answered question.

Few stations have recorded rainfalls for more than 100 years, and networks of rain gauges are generally inadequate. If all the gauges in the U.S. were concentrated in one group, the total area covered would be about a six-thousandth of a square mile, which is less than that of a standard baseball diamond.

All the highest observed rainfalls in the United States, with one exception, were associated either with tropical disturbances or with temporarily intensified inland flow of moist air from the Gulf of Mexico. The one week and longer records held by Cherrapunji, India, were monsoonal rains.

Knowledge of the expected highest rains is necessary in designing dams for controlling run-off from large watersheds. It is also necessary in designing airfields, highway culverts and bridges, small dams, storm sewers, etc.

Science News Letter, May 3, 1958

GENERAL SCIENCE

Science Fairs Grow Up

In addition to providing public exhibits of students' scientific work, the science fair has become a good means of finding students who will become scientists and engineers.

By SHIRLEY MOORE

➤ THE SCIENCE FAIR is growing up and is developing the potentials that were an inspired part of its earliest beginnings.

In this Year of the Satellites, some of its bright realities will be spotlighted as fairs all over this country, its possessions, and even in foreign lands send their best high school exhibitors to the National Science Fair in Flint, Mich., May 7 through 10.

A SCIENCE SERVICE study of the progress of the finalists of the eight previous National Science Fairs, now being completed by Margaret E. Patterson, executive secretary of Science Clubs of America, is revealing dramatic evidence of what the fairs actually do accomplish.

One very heartening "proof of the pudding" is evident in the hundreds of former finalists now in college and graduate school, preparing for careers in scientific specialties. Of the undergraduates who responded to Miss Patterson's detailed inquiry, 91.8% are majoring in science or education.

Of the older ones, most of whom have completed their advanced schooling, 52 men and women report assignments in the armed forces or full-time jobs. Of these, 84.6% are in scientific fields or education.

Early Fair Finalist

Dominic B. Edelen, one of the finalists in the first National Science Fair, held in 1950, is a good example of what becomes of the high school scientists honored at the national event. Mr. Edelen, soon to be "Dr. Edelen" as he completes work for his doctorate in mathematics at Johns Hopkins University, is head of the Dynamics Group on Project Vanguard at The Martin Company in Baltimore, Md.

This 25-year-old research mathematician has been responsible for analyzing control problems arising from the complex movements of the satellite launching rockets before and during flight.

Mr. Edelen is also a visiting lecturer at Drexel Institute, Philadelphia, and has published two papers on mathematics. Other papers he has written on missile system analysis are still "classified."

Four years ago, he and Erica von Eschenburg were married, and their son was born the following year. Mrs. Edelen has a B.A. in history and English and has done graduate work in philosophy.

The winning project that Dominic took to the National Science Fair eight years ago was a Van de Graaff generator using an accelerator tube he had improvised. This exhibit won a third prize in physical science.

His interest since then has ranged through such problems as the fourier heat conduction equation and the elastic wave equations. His doctoral dissertation is "The Extension of the Theory of Canonical Maps for a System of Tensorial Partial Differential Equations Which Arise From the Calculus of Variations in n Independent Variables."

Similarly, the plans and accomplishments of other finalists prove that the hope invested in the science fairs has been fulfilled beyond the most optimistic expectations.

Millions of visitors go to their local fairs with greater understanding now, and they leave with renewed hope for the future of humankind. For science fairs are no longer static exhibitions of collections, models and cardboard posters, but are like colorful laboratories filled with work-in-progress and the cheerful evidence of young minds energetically in motion.

The community science fair is a lively spring tonic to science-mindedness that has become an annual event prepared for and looked forward to by both students and adults. Even the smallest fry are eager fair visitors who stand on tiptoe to look at protozoa through a microscope or listen delightedly to the roar of a tornado vortex model, sensing a little of the fine elation of tracking down truth for oneself.

The great interest in the fairs is reflected in the way they have grown in sheer size. For example, in 1947 seven schools exhibited 14 projects at the Lehigh Valley Science Fair in Allentown, Pa. This fair was visited by 100 students. In April, 1958, 822 top level projects were exhibited to 30,000 visitors. The 822 represented the best of 8,087 projects seen by 40,000 people in 28 preliminary school fairs!

If science fairs accomplished nothing more, observers are convinced that they would be extremely valuable just as a hometown way of keeping everybody in touch with the current work of their schools and educators. There is probably no easier way to catch the contagious excitement of "just being around to watch in 1958," as someone put it, than to listen to neighborhood Bobs and Mary Annes as they demonstrate their science projects on a solar power plant, an experimental rocket design or their first try at research in new plastics. After an evening at a science fair many adults make comments like:

"I've never learned so much so fast . . . this has been a stimulating and humbling experience!"

But the fairs accomplish very much more than this. One of the most important factors mentioned by students and educators is the opportunity for a young person to discover that he can explore and understand

SCIENCE FAIR FINALIST GROWS UP—This is Dominic B. Edelen, finalist in the first National Science Fair in 1950. Now, at 25, he is head of the Dynamics Group on Project Vanguard at The Martin Company in Baltimore, Md., responsible for the complex mathematics of the satellite launching rockets. The model in his hand is the Navy-Martin satellite launching rocket. The tapes are telemetry reports from a recent flight.

for himself, not only what other people have discovered, but also whatever is still hidden in the limitless reaches of what nobody knows.

Benefits of Participation

As a New Jersey science fair administrator put it, "Science fairs encourage an inquiring mind, ingenuity, resourcefulness; provide an outlet for enthusiasm and the craving for activity that yields results; and bring to light qualities and abilities that otherwise might not be discovered."

The science fair gives a young person, his parents, his teacher and all the other people who have advised and encouraged him, the pleasant and stimulating reward of public recognition. A special side of this is described by Mary Ploog Dankleff, who represented the Northeast Iowa Science Fair at the National Science Fair in 1954, now a senior in college and married to an English instructor.

"Science fair recognition on the high school level is one of the few ways by which a girl has an equal opportunity to prove her worth," Mrs. Dankleff said in an interview for an article in the Waterloo Daily Courier on the influence of the science fairs upon the careers of Iowa's winners. "Each time a girl does receive such recognition," she commented, "she widens a bit the opportunities for herself and other women, and she persuades teachers and employers to give her the opportunity to train professionally in the area of science."

Mrs. Dankleff won a four-year scholarship to Iowa State Teachers College, an award from the Iowa State Science Talent Search, and a place on the honor roll at the Iowa Junior Academy of Science science fair. In college she has won membership in national honor societies in mathematics, biological sciences and physical sciences. She will enter graduate school next fall to work toward a Ph.D. in chemistry.

Good Winners and Losers

Participating in science fairs also can teach a young person the somewhat elusive technique of winning and losing well; that is, without undue puffing up or collapse of self-esteem. Teachers and students report that winning has a way of inspiring further trying, often followed by more succeeding. In fact, some students admit frankly that their interest in training for a career in science or technology began when they won a science fair award for a project started "under duress" because it was required by a chemistry, physics or biology teacher. Science fair directors and judges also reminisce about instances when losing showed that a youngster had "what it took," and stimulated him into developing really excellent work habits and attitudes.

Suzan Lynn Hopkins, another Iowa winner and a 1956 National Science Fair finalist, said that although she discovered science and her desire for a career in research through her first science fair project, her decision to go into medical research was not "simply because I happened to be fortunate enough to win first place in the science fair. I would have done so had I received no recognition at all.

"Anyone who enters a science fair hoping to win a prize," said Suzan, "really has a distorted sense of values. The experience and knowledge one gains from working on a project outweighs by far any material awards or recognition he might receive."

Now completing her first year as a premedical student at the University of Iowa, Suzan looks forward to a degree in medicine and further graduate work in chemistry.

Teachers and parents say that in planning and putting together a project a student discovers ways of finding answers, through books, magazines, scientific papers and his own experiments, that can enrich all the rest of his life, whatever his eventual career.

Boys and girls also discover that being part of a science fair brings them into contact with other searching minds, both in their own generation and among educators and working scientists. Many a teen-ager, who had felt "different" and lonely in his questioning, has confessed that this is an unexpected and immensely gratifying experience.

Fairs: A Communication Aid

Many students say that continued science fair activity has helped them to find ways of communicating facts, "hunches," and the way they feel about both, to other people. Educators agree that such ability is rather sadly rare among scientists, thinkers of all kinds and even among teachers.

The science fair is one of the best ways anyone has discovered to give students an incentive to work independently on projects they have chosen for themselves, an experience educators feel is really important in the development of a young scientist.

It is pretty obvious that not all, or maybe even many, of the students who go into local science fairs are going to become tomorrow's top level research scientists. An unknown number of them will never be any kind of a scientist, engineer or technologist. But many fair administrators have declared that if even a small percentage of the young exhibitors discover that they want to be scientists, the planning and work that go into the fairs will be richly repaid. Those whose lives travel along other paths will have gained, at the very least, some background for intelligent understanding and choice in a science-based civilization.

Science News Letter, May 3, 1958

ENGINEERING

Develop 30-Pound Gas Turbine Engine

➤ A MINIATURE gas turbine capable of delivering either five or ten horsepower has been developed by Propulsion Research Corporation engineers, Santa Monica, Calif.

Named the Turbo-Mite, the 30-pound gas turbine is described as the smallest ever developed. Lightweight and portable, it is designed to be used as an auxiliary power unit, portable pump, portable pneumatic source or portable ground power.

The Turbo-Mite will operate at temperatures from 65 degrees below zero to 165 degrees Fahrenheit.

Science News Letter, May 3, 1958

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AFRICAN NEGRO SCULPTURE—Margaret Plass, introduction by Carleton S. Coon—*University Museum*, Bulletin Volume 21, Number 4, 76 p., illus. with photographs by Reuben Goldberg, paper, 50¢. An introduction to exhibits on display at the Museum.

ANTONY VAN LEEUWENHOEK AND HIS "LITTLE ANIMALS": Being Some Account of the Father of Protozoology & Bacteriology and His Multifarious Discoveries in These Disciplines—Collected, translated and edited from his printed works, unpublished manuscripts and contemporary records by Clifford Dobell, introduction by Cornelis B. van Niel—*Russell & Russell*, 435 p., illus., $10. A rekindled enthusiasm for Leeuwenhoek, the introduction comments, should help counteract our excessive specialization.

THE ARCHAEOLOGY OF THE ROMAN EMPIRE: A Scheme of Study—I. A. Richmond—*Oxford Univ. Press*, 21 p., paper, 40¢. A lecture delivered at the University.

THE ASTRONOMICAL UNIVERSE—Otto Struve—*Oregon State System of Higher Education*, Condon Lectures, 55 p., illus., paper, $1.50. Because of sputnik, the year 1957 will be remembered in the history of astronomical exploration as the year 1492 is remembered in the history of geographical exploration.

THE ATOMIC AGE AND OUR BIOLOGICAL FUTURE—H. V. Bronsted, translated by E. M. Huggard—*Philosophical Lib.*, 80 p., $2.75. Based on a series of lectures to the general public.

ATOMIC PHYSICS AND HUMAN KNOWLEDGE—Niels Bohr—*Wiley*, 101 p., illus., $3.95. Presenting the essential aspects of the situation in quantum physics and stressing points of similarity to positions in other fields of knowledge.

BASIC PRINCIPLES OF CHEMISTRY—Eugene C. Winslow—*Van Nostrand*, 284 p., illus., $4.75. A concise text for first year college students.

BIOGRAPHICAL MEMOIRS OF FELLOWS OF THE ROYAL SOCIETY 1957, Volume 3—*The Royal Society*, 328 p., illus., $4.20. Including portraits and obituary notices of leading scientists.

COLORADO GEM TRAILS AND MINERAL GUIDE—Richard M. Pearl—*Sage*, 176 p., illus., $2.95. An aid for mineral collectors.

COMMON SENSE ABOUT GIFTED CHILDREN—Willard Abraham—*Harper*, 268 p., illus., $5. Advice on how to tell if your child is gifted and how to encourage and help him develop all his potentialities.

THE CONQUEST OF LONELINESS—Eric P. Mosse—*Random House*, 241 p., $3.75. Hate, the author points out, is the number one enemy that makes it impossible to build a bridge to others to overcome loneliness.

DE LESSEPS, BUILDER OF SUEZ—Laura Long—*Longmans*, 154 p., illus., $2.75. This biography is the story of the great waterway.

A DICTIONARY OF CONTEMPORARY AMERICAN USAGE—Bergan Evans and Cornelia Evans—*Random House*, 567 p., $5.95. A useful reference work for those who write.

A DICTIONARY OF MOUNTAINEERING—R. G. Collomb—*Philosophical Lib.*, 175 p., illus., $6. Defining mountaineering terms from "abseil" to "zinne."

DRAINAGE OF AGRICULTURAL LANDS—James N. Luthin, Ed.—*Am. Soc. of Agronomy*, 620 p., illus., $11. Discussing means of removing excess subsurface water and the relationships between water tables and crops.

ELECTRONIC HOBBYISTS' HANDBOOK—Rufus P. Turner—*Gernsback*, 160 p., illus., paper, $2.50. A collection of practical circuits for the experimenter.

ELECTRONS AT WORK—F. J. M. Laver—*Oxford Univ. Press*, 78 p., 8 pl., illus., $1.20. Describing non-technically the use of electricity for telecommunications and electronics.

THE ENCYCLOPAEDIA OF RADIO AND TELEVISION: A Complete Alphabetical Reference to All Aspects of Modern Radio Technology—S. W. Amos and others—*Philosophical Lib.*, 2d ed., 736 p., illus., $12. Containing over 3,000 entries.

ENCYCLOPEDIA OF CHEMICAL REACTIONS: Volume VII (Strontium-Titanium)—Compiled by C. A. Jacobson, edited by Clifford A. Hampel—*Reinhold*, 479 p., $12.75. A reference work.

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THE GEOPHYSICAL JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY: Volume 1, No. 1, March 1958—*Royal Astronomical Society*, 114 p., illus., paper, quarterly, $3 per copy, $9 per year. Devoted to work on seismology, geodesy, gravity measurements, terrestrial magnetism, etc. Contains summaries in Russian of all articles.

A HISTORY OF MAGIC AND EXPERIMENTAL SCIENCE: Volumes VII and VIII, The Seventeenth Century—Lynn Thorndike—*Columbia Univ. Press*, Vol. VII, 695 p., Vol. VIII, 808 p., $10 each volume. These two volumes conclude the author's monumental work begun over 50 years ago.

THE INDISPENSABLE MAN . . . THE ELECTRICAL ENGINEER—*Am. Inst. of Electrical Engineers*, 20 p., illus., paper, free upon request direct to publisher, 33 West 39th St., New York 18, N. Y. Guidance for high-school students interested in engineering as a career, advising them how best to prepare for it.

INSTRUMENTATION AND CONTROL IN THE PROCESS INDUSTRIES: Proceedings of the Conference—R. D. Huntoon and others—*Armour Research Foundation*, 145 p., illus., paper, $4. Instrumentation is "measurement in action."

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THE STRATEGY OF CHEMOTHERAPY: Eighth Symposium of the Society for General Microbiology Held at the Royal Institution, London, April, 1958—S. T. Cowan and Elizabeth Rowatt, Eds.—*Cambridge Univ. Press*, for the Society for General Microbiology, 360 p., illus., $7. The organizer of the symposium invited contributors to suggest fresh ways of attacking micro-organisms without damaging the host.

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TUBERCULOSIS IN WHITE AND NEGRO CHILDREN: Volume II, The Epidemiologic Aspects of the Harriet Lane Study—Miriam E. Brailey —*Harvard Univ. Press* for the Commonwealth Fund, 103 p., graphs, $4.50. Death from tuberculosis among white children infected before the age of three was found to be about 9%; for Negroes it was nearly 22%.

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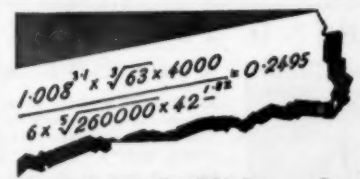

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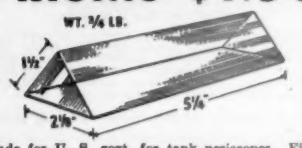

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PLANT PHYSIOLOGY

Plant Has "Heart Attack"

➤ PLANTS such as bananas, tomatoes and peas can suffer "strokes" and "heart attacks" caused by clots in their veins just as humans suffer attacks due to clots in their blood vessels.

Two University of Wisconsin scientists identified the causes of several widespread and economically important plant wilts and reported a method of developing plants that are resistant to the diseases.

Death-dealing wilts of many vegetables as well as cotton plants, oak and elm trees were blamed on a soil fungus by Drs. Mark A. Stahmann, department of biochemistry, and J. C. Walker, department of plant pathology. They reported their research to a meeting of the American Chemical Society in San Francisco.

Fusarium fungus, a simple plant having no root, stem or leaf system and similar to molds, toadstools, bacteria and yeast, may penetrate a plant's vascular system, Dr. Stahmann said.

Once inside the plant's veins, or "blood vessels," the fungi produce a substance, an enzyme, that attacks some of the pectin in the vessel walls.

Pectin fragments then break off into the vascular stream where they form gelatinous masses of clots that plug the vessels. This action is similar to blood clots clogging human blood vessels to cause strokes or heart attacks.

Fortunately, Dr. Stahmann said, some varieties of the plants investigated are not susceptible to wilt diseases and it is possible to develop resistant plant strains.

Using their new understanding of wilt disease causes, the scientists then began the difficult task of finding out exactly what enables certain plant strains to resist wilt.

Although they have not completely identified the resistance mechanism, they reported the resistant plants seem to produce a substance toxic to the invading fungi. Also, the disease-resistant plants apparently fail to produce normal amounts of another enzyme essential to the formation of the fatal pectin plugs.

Science News Letter, May 3, 1958

TECHNOLOGY

Automatic Machine Designed for Post Offices

➤ LETTERS may in the future enter and leave U.S. post offices much faster, thanks to an automatic high-speed sorting machine.

A laboratory prototype machine, developed by the Rabinow Engineering Co., is designed to sort 36,000 letters per hour. Sorting can be directed either by a built-in electronic control, by human operators, or a combination of the two.

Two problems had to be solved in machine-sorting letters: translating the address information and controlling the computer-like device that directs the mail sort is one problem. The other has to do with the physical handling of the letters in all their various sizes and shapes.

Letters mechanically placed in a reading-and-coding position are read by a human operator. The important parts of the address are abbreviated and typed by means of a special printer on the envelope back. The operator then sends the letter through its first sort by pushing one of four buttons —local, outgoing, airmail or miscellaneous. Altogether, it takes a few seconds to accomplish these steps.

The National Bureau of Standards, which arranged and supervised the engineering contract in behalf of the U.S. Post Office Department, reports this may ultimately be the only human operation in the entire sorting process.

An electro-mechanical-optical device serves as an electronic directory, "looking up" the sorting destination for each address and controlling the delivery of the letter to its destination receptacle. This takes about one-tenth of a second.

The basic units of the automatic sorting machine can be arranged in various ways to suit the size and special problems of different post offices.

It is expected these machines will be an important help to post office personnel in keeping up with the continuing rapid growth of letter mail.

Science News Letter, May 3, 1958

Questions

CHEMISTRY—How much berkelium has been isolated? p. 280.

MEDICINE—When can the usual method of detecting fetal heartbeat, by means of the stethoscope, be used successfully? p. 279.

PLANT PHYSIOLOGY—What is one way scientists believe clots form in plants' veins? p. 286.

TECHNOLOGY—What are diffraction gratings used for? p. 281.

Photographs: Cover, Westinghouse; p. 275, Bendix Aviation Corporation; p. 277, Bell Telephone Laboratories; p. 278, New York Academy of Sciences; p. 279, Dow Corning Corporation; p. 282, The Martin Company; p. 288, Park Plastic Co.

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In most large cities in the northeast U.S., *population* either has grown slowly, less than one percent a year, or has actually decreased since 1950.

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The *South Pole* receives more sun than any place on earth during December, its midsummer, but most of this energy is reflected by the ice cover.

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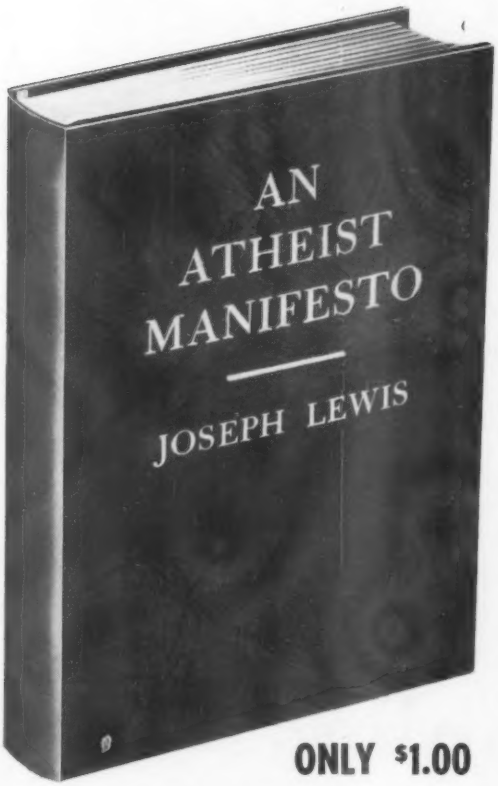

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⚙ *MARINE FIRE EXTINGUISHERS contain dry chemical fire-fighters. Two models are available, a portable for small craft with accessible engines, and a semiportable for large boats. Both models have salt water resistant undercoatings and come in red, light blue and white.*

Science News Letter, May 3, 1958

⚙ *BRITISH ELECTRIC STOVE has a removable, disposable roof of aluminum foil. It also has six six-heat control plates and a griddle plate. The stove further boasts an electric eye-level grill controlled by a three-heat switch.*

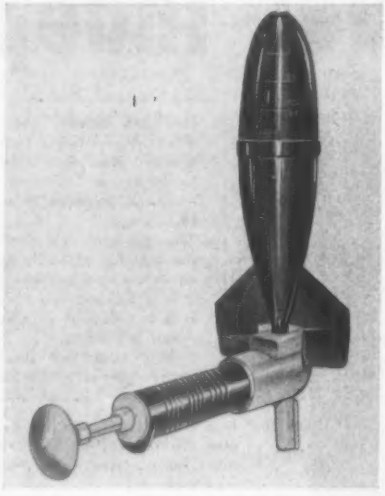
Science News Letter, May 3, 1958

⚙ *GARMENT HOLDER for travelers fits all sedan model automobiles. Installed without the need for tools, the hanger holds up to a dozen suits or dresses. It is rust-proof and driving visibility is said to be unaffected.*

Science News Letter, May 3, 1958

⚙ *PROJECTION VIEWSCOPE will fit any microscope with a monocular tube. The viewscope has a prism lens system that produces images on a five-inch viewing screen. The coarse and fine focusing knobs of the microscope bring the specimen into focus on the viewscope.*

Science News Letter, May 3, 1958



⚙ *CHILDREN'S ROCKET SET, shown in the photograph, consists of a pump, a butyrate plastic rocket, and an eight-ounce water fuel supply tank. The tank can be fastened to a belt and holds enough water fuel for 20 flights of the rocket. Rocket can be sent soaring to 50, 75, 100 or more feet.*

Science News Letter, May 3, 1958

⚙ *CARD GAME is played with standard card decks and any number of players from two to six can play. It entails two trump suits, wild cards and a scoreboard. Plastic scoreboard and rules are included.*

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⚙ *ARTIFICIAL SOIL can be rolled on like a carpet. The garden mat contains organic materials, seeds, plant foods, inoculants, minerals, regulators and hormones. Weighing 24 ounces, the mat can be rolled out to cover an area of 18 feet by one foot. The quarter-inch thick mat requires only water to promote flower growth.*

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⚙ *STEREOPHONIC AMPLIFIER is said to enable ordinary records, tape, or FM radio to give stereophonic reproduction. The impulse from an ordinary record changer, tape recorder or radio is fed into the amplifier and separated into low and high frequency components. The listener hears music emanating from different instruments and different directions.*

Science News Letter, May 3, 1958

Nature Ramblings

By HORACE LOFTIN

➤ PROPPED AGAINST a pine tree before the field laboratory of Florida State University's Oceanographic Institute is a long, narrow, bleached piece of bone. This skeletal piece extends higher than the eaves of the building, yet it is only the jawbone of the monstrous animal it came from.

The jawbone was found buried in the sand along the Gulf of Mexico near Alligator Harbor. Identification by an expert proved it to come from a sperm whale, one of the few records from that part of the world.

As big as it is, this jawbone is not much as whales go. The great sulphur bottomed whale dwarfs the largest dinosaur that ever existed. An adult elephant could stand inside the bulk of that leviathan, which attains some 100 feet in length.

The whalers of the "Moby Dick" days largely ignored the whales that make up

Th'ar She Blows!

most of today's catches. Moby Dick himself was a sperm whale, one of that toothed, aggressive group of whales the old New Bedford men sought out around the world. The sperm whale was especially favored because of the tremendous store of oil to be found in its head. This could literally be dipped out by the bucketsful.

Today's whalers generally go after the large "whalebone" whales, that group without teeth. With modern methods of obtaining oil from the flesh, more efficient (if less romantic) means of killing the beasts, and factory vessels on the spot, it now pays to take species once scorned by Captain Ahab and his contemporaries.

All whales and porpoises, or dolphins, belong to the order of mammals called Cetacea.

Mammal-like, the young are born alive and are suckled at the breast. Their general body form is fish-like, with the fore limbs evolved into fin-like paddles and hind limbs totally absent externally. (Some species have traces of limbs deep within their bodies, relics of life on the dry earth many aeons past.)

If there is ever any doubt as to whether a denizen of the sea is a large fish or a whale, one look at the tail will answer the question. In fish, the tail runs up and down; in all whales, it is flattened horizontally.

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